SEQUENCE LISTING

<110> Xenon Genetics Inc.

<120> Juvenile Hemochromatosis Gene (HFE2A), Expression Products and Uses Thereof

<130> 836-115PCT

<140> N/A
<141> 2004-04-08

<150> 60/461,615
<151> 2003-04-09

<150> 60/462,867
<151> 2003-04-15

<150> 60/488,607
<151> 2003-07-18

<150> 60/498,458
<151> 2003-08-28

<160> 62

<170> PatentIn version 3.0

<210> 1
<211> 149
<212> DNA
<213> Homo sapiens

<400> 1
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 60
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 120
agcagagtaa tgtttgacct ctggaaaca 149

<210> 2
<211> 204
<212> DNA
<213> Homo sapiens

<400> 2
ccaaatttct tttttcagtc acttacaggg cttccggtca aaattcacta ggtaggaggg 60
tcatcagctg ggaagaaccg gcgcctggga aacctggctg gataggtatg ggggagccag 120
gccagtcccc tagtcccagg tcctcccatg gcagtccccc aactctaagc actctcactc 180
tcctgctgct cctctgtgga catg 204

<210> 3
<211> 37
<212> DNA
<213> Homo sapiens

<400> 3
ctcattctca atgcaagatc ctccgctgca atgctga 37

<210> 4
<211> 560
<212> DNA
<213> Homo sapiens

<400> 4
ctcattctca atgcaagatc ctccgctgca atgctgagta cgtatcgtcc actctgagcc 60
ttagaggtgg gggttcatca ggagcacttc gaggaggagg aggaggaggc cggggtggag 120
gggtgggctc tggcggcctc tgtcgagccc tccgctccta tgcgctctgc actcggcgca 180
ccgcccgcac ctgccgcggg gacctcgcct tccattcggc ggtacatggc atcgaagacc 240
tgatgatcca gcacaactgc tcccgccagg gccctacagc ccctcccccg ccccggggcc 300
ccgcccttcc aggcgcgggc tccggcctcc ctgccccgga cccttgtgac tatgaaggcc 360
ggttttcccg gctgcatggt cgtcccccgg ggttcttgca ttgcgcttcc ttcggggacc 420
cccatgtgcg cagcttccac catcactttc acacatgccg tgtccaagga gcttggcctc 480
tactggataa tgacttcctc tttgtccaag ccaccagctc ccccatggcg ttgggggcca 540
acgctaccgc cacccggaag 560

<210> 5
<211> 1230
<212> DNA
<213> Homo sapiens

<400> 5
ctcaccatca tatttaagaa catgcaggaa tgcattgatc agaaggtgta tcaggctgag 60
gtggataatc ttcctgtagc ctttgaagat ggttctatca atggaggtga ccgacctggg 120
ggatccagtt tgtcgattca aactgctaac cctgggaacc atgtggagat ccaagctgcc 180
tacattggca caactataat cattcggcag acagctgggc agctctcctt ctccatcaag 240
gtagcagagg atgtggccat ggccttctca gctgaacagg acctgcagct ctgtgttggg 300
gggtgccctc caagtcagcg actctctcga tcagagcgca atcgtcgggg agctataacc 360
attgatactg ccagacggct gtgcaaggaa gggcttccag tggaagatgc ttacttccat 420
tcctgtgtct ttgatgtttt aatttctggt gatcccaact ttaccgtggc agctcaggca 480
gcactggagg atgcccgagc cttcctgcca gacttagaga agctgcatct cttcccctca 540
gatgctgggg ttcctctttc ctcagcaacc ctcttagctc cactcctttc tgggctcttt 600
gttctgtggc tttgcattca gtaaggggac catcagtccc attactagtt tggaaatgat 660
ttggagatac agattggcat agaagaatgt aaagaatcat taaaggaagc agggcctagg 720
agacacgtga aacaatgaca ttatccagag tcagatgagg ctgcagtcca gggttgaaat 780
tatcacagaa taaggattct gggcaaggtt actgcattcc ggatctctgt ggggctcttc 840
accaattttt ccagcctcat ttatagtaaa caaattgttc taatccattt actgcagatt 900
tcacccttat aagtttagag gtcatgaagg ttttaatgat cagtaaagat ttaagggttg 960
agatttttaa gaggcaagag ctgaaagcag aagacatgat cattagccat aagaaactca 1020
aaggaggaag acataattag ggaaagaagt ctatttgatg aatatgtgtg tgtaaggtat 1080
gttctgcttt cttgattcaa aaatgaagca ggcattgtct agctcttagg tgaagggagt 1140
ctctgctttt gaagaatggc acaggtagga cagaagtatc atccctaccc cctaactaat 1200
ctgttattaa agctacaaat tcttcacacc 1230

<210> 6
<211> 1379
<212> DNA
<213> Homo sapiens

<400> 6

cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 60
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 120
agcagagtaa tgtttgacct ctggaaacac tcaccatcat atttaagaac atgcaggaat 180
gcattgatca gaaggtgtat caggctgagg tggataatct tcctgtagcc tttgaagatg 240
gttctatcaa tggaggtgac cgacctgggg gatccagttt gtcgattcaa actgctaacc 300
ctgggaacca tgtggagatc caagctgcct acattggcac aactataatc attcggcaga 360
cagctgggca gctctccttc tccatcaagg tagcagagga tgtggccatg gccttctcag 420
ctgaacagga cctgcagctc tgtgttgggg ggtgccctcc aagtcagcga ctctctcgat 480
cagagcgcaa tcgtcgggga gctataacca ttgatactgc cagacggctg tgcaaggaag 540
ggcttccagt ggaagatgct tacttccatt cctgtgtctt tgatgtttta atttctggtg 600
atcccaactt taccgtggca gctcaggcag cactggagga tgcccgagcc ttcctgccag 660
acttagagaa gctgcatctc ttccccctcag atgctggggt tcctctttcc tcagcaaccc 720
tcttagctcc actcctttct gggctctttg ttctgtggct ttgcattcag taaggggacc 780
atcagtccca ttactagttt ggaaatgatt tggagataca gattggcata gaagaatgta 840
aagaatcatt aaaggaagca gggcctagga gacacgtgaa acaatgacat tatccagagt 900
cagatgaggc tgcagtccag ggttgaaatt atcacagaat aaggattctg ggcaaggtta 960
ctgcattccg gatctctgtg gggctcttca ccaatttttc cagcctcatt tatagtaaac 1020
aaattgttct aatccattta ctgcagattt cacccttata agtttagagg tcatgaaggt 1080
tttaatgatc agtaaagatt taagggttga gatttttaag aggcaagagc tgaaagcaga 1140
agacatgatc attagccata agaaactcaa aggaggaaga cataattagg gaaagaagtc 1200
tatttgatga atatgtgtgt gtaaggtatg ttctgctttc ttgattcaaa aatgaagcag 1260
gcattgtcta gctcttaggt gaagggagtc tctgcttttg aagaatggca caggtaggac 1320
agaagtatca tccctacccc ctaactaatc tgttattaaa gctacaaatt cttcacacc 1379

<210> 7
<211> 1416
<212> DNA
<213> Homo sapiens

<400> 7
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 60
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 120
agcagagtaa tgtttgacct ctggaaacac tcattctcaa tgcaagatcc tccgctgcaa 180
tgctgactca ccatcatatt taagaacatg caggaatgca ttgatcagaa ggtgtatcag 240
gctgaggtgg ataatcttcc tgtagccttt gaagatggtt ctatcaatgg aggtgaccga 300
cctgggggat ccagtttgtc gattcaaact gctaaccctg ggaaccatgt ggagatccaa 360
gctgcctaca ttggcacaac tataatcatt cggcagacag ctgggcagct ctccttctcc 420
atcaaggtag cagaggatgt ggccatggcc ttctcagctg aacaggacct gcagctctgt 480
gttgggggt gccctccaag tcagcgactc tctcgatcag agcgcaatcg tcggggagct 540
ataaccattg atactgccag acggctgtgc aaggaagggc ttccagtgga agatgcttac 600
ttccattcct gtgtctttga tgttttaatt tctggtgatc ccaactttac cgtggcagct 660
caggcagcac tggaggatgc ccgagccttc ctgccagact tagagaagct gcatctcttc 720
ccctcagatg ctggggttcc tctttcctca gcaaccctct tagctccact cctttctggg 780
ctctttgttc tgtggctttg cattcagtaa ggggaccatc agtcccatta ctagtttgga 840
aatgatttgg agatacagat tggcatagaa gaatgtaaag aatcattaaa ggaagcaggg 900
cctaggagac acgtgaaaca atgacattat ccagagtcag atgaggctgc agtccagggt 960
tgaaattatc acagaataag gattctgggc aaggttactg cattccggat ctctgtgggg 1020
ctcttcacca atttttccag cctcatttat agtaaacaaa ttgttctaat ccatttactg 1080
cagatttcac ccttataagt ttagaggtca tgaaggtttt aatgatcagt aaagatttaa 1140
gggttgagat ttttaagagg caagagctga aagcagaaga catgatcatt agccataaga 1200
aactcaaagg aggaagacat aattagggaa agaagtctat ttgatgaata tgtgtgtgta 1260
aggtatgttc tgctttcttg attcaaaaat gaagcaggca ttgtctagct cttaggtgaa 1320
gggagtctct gcttttgaag aatggcacag gtaggacaga agtatcatcc ctacccccta 1380
actaatctgt tattaaagct acaaattctt cacacc 1416

<210> 8
<211> 1939
<212> DNA
<213> Homo sapiens

<400> 8
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 60
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 120
agcagagtaa tgtttgacct ctggaaacac tcattctcaa tgcaagatcc tccgctgcaa 180
tgctgagtac gtatcgtcca ctctgagcct tagaggtggg ggttcatcag gagcacttcg 240
aggaggagga ggaggaggcc ggggtggagg ggtgggctct ggcggcctct gtcgagccct 300
ccgctcctat gcgctctgca ctcggcgcac cgcccgcacc tgccgcgggg acctcgcctt 360
ccattcggcg gtacatggca tcgaagacct gatgatccag cacaactgct cccgccaggg 420
ccctacagcc cctcccccgc cccggggccc cgcccttcca ggcgcgggct ccggcctccc 480
tgccccggac ccttgtgact atgaaggccg gttttcccgg ctgcatggtc gtcccccggg 540
gttcttgcat tgcgcttcct tcggggaccc ccatgtgcgc agcttccacc atcactttca 600
cacatgccgt gtccaaggag cttggcctct actggataat gacttcctct ttgtccaagc 660
caccagctcc cccatggcgt tgggggccaa cgctaccgcc acccggaagc tcaccatcat 720
atttaagaac atgcaggaat gcattgatca gaaggtgtat caggctgagg tggataatct 780
tcctgtagcc tttgaagatg gttctatcaa tggaggtgac cgacctgggg gatccagttt 840
gtcgattcaa actgctaacc ctgggaacca tgtggagatc caagctgcct acattggcac 900
aactataatc attcggcaga cagctgggca gctctccttc tccatcaagg tagcagagga 960
tgtggccatg gccttctcag ctgaacagga cctgcagctc tgtgttgggg ggtgccctcc 1020
aagtcagcga ctctctcgat cagagcgcaa tcgtcgggga gctataacca ttgatactgc 1080
cagacggctg tgcaaggaag ggcttccagt ggaagatgct tacttccatt cctgtgtctt 1140
tgatgtttta atttctggtg atcccaactt taccgtggca gctcaggcag cactggagga 1200
tgcccgagcc ttcctgccag acttagagaa gctgcatctc ttcccctcag atgctggggt 1260
tcctctttcc tcagcaaccc tcttagctcc actcctttct gggctctttg ttctgtggct 1320
ttgcattcag taaggggacc atcagtccca ttactagttt ggaaatgatt tggagataca 1380
gattggcata gaagaatgta aagaatcatt aaaggaagca gggcctagga gacacgtgaa 1440
acaatgacat tatccagagt cagatgaggc tgcagtccag ggttgaaatt atcacagaat 1500
aaggattctg ggcaaggtta ctgcattccg gatctctgtg gggctcttca ccaatttttc 1560
cagcctcatt tatagtaaac aaattgttct aatccattta ctgcagattt cacccttata 1620
agtttagagg tcatgaaggt tttaatgatc agtaaagatt taagggttga gatttttaag 1680
aggcaagagc tgaaagcaga agacatgatc attagccata agaaactcaa aggaggaaga 1740
cataattagg gaaagaagtc tatttgatga atatgtgtgt gtaaggtatg ttctgctttc 1800
ttgattcaaa aatgaagcag gcattgtcta gctcttaggt gaagggagtc tctgcttttg 1860
aagaatggca caggtaggac agaagtatca tccctacccc ctaactaatc tgttattaaa 1920
gctacaaatt cttcacacc 1939

<210> 9
<211> 2143
<212> DNA
<213> Homo sapiens

<400> 9
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 60
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 120
agcagagtaa tgtttgacct ctggaaacac caaatttctt ttttcagtca cttacagggc 180
ttccggtcaa aattcactag gtaggagggt catcagctgg gaagaaccgg cgcctgggaa 240
acctggctgg ataggtatgg gggagccagg ccagtcccct agtcccaggt cctcccatgg 300
cagtccccca actctaagca ctctcactct cctgctgctc ctctgtggac atgctcattc 360
tcaatgcaag atcctccgct gcaatgctga gtacgtatcg tccactctga gccttagagg 420
tgggggttca tcaggagcac ttcgaggagg aggaggagga ggccggggtg gaggggtggg 480

```
ctctggcggc ctctgtcgag ccctccgctc ctatgcgctc tgcactcggc gcaccgcccg   540
cacctgccgc ggggacctcg ccttccattc ggcggtacat ggcatcgaag acctgatgat   600
ccagcacaac tgctcccgcc agggccctac agcccctccc ccgccccggg gccccgccct   660
tccaggcgcg ggctccggcc tccctgcccc ggacccttgt gactatgaag gccggttttc   720
ccggctgcat ggtcgtcccc cggggttctt gcattgcgct tccttcgggg acccccatgt   780
gcgcagcttc caccatcact ttcacacatg ccgtgtccaa ggagcttggc ctctactgga   840
taatgacttc ctctttgtcc aagccaccag ctcccccatg gcgttggggg ccaacgctac   900
cgccacccgg aagctcacca tcatatttaa gaacatgcag gaatgcattg atcagaaggt   960
gtatcaggct gaggtggata atcttcctgt agcctttgaa gatggttcta tcaatggagg  1020
tgaccgacct gggggatcca gtttgtcgat tcaaactgct aaccctggga accatgtgga  1080
gatccaagct gcctacattg gcacaactat aatcattcgg cagacagctg ggcagctctc  1140
cttctccatc aaggtagcag aggatgtggc catggccttc tcagctgaac aggacctgca  1200
gctctgtgtt ggggggtgcc ctccaagtca gcgactctct cgatcagagc gcaatcgtcg  1260
gggagctata accattgata ctgccagacg gctgtgcaag gaagggcttc cagtggaaga  1320
tgcttacttc cattcctgtg tctttgatgt tttaatttct ggtgatccca actttaccgt  1380
ggcagctcag gcagcactgg aggatgcccg agccttcctg ccagacttag agaagctgca  1440
tctcttcccc tcagatgctg gggttcctct ttcctcagca accctcttag ctccactcct  1500
ttctgggctc tttgttctgt ggctttgcat tcagtaaggg gaccatcagt cccattacta  1560
gtttggaaat gatttggaga tacagattgg catagaagaa tgtaaagaat cattaaagga  1620
agcagggcct aggagacacg tgaaacaatg acattatcca gagtcagatg aggctgcagt  1680
ccagggttga aattatcaca gaataaggat tctgggcaag gttactgcat tccggatctc  1740
tgtggggctc ttcaccaatt tttccagcct catttatagt aaacaaattg ttctaatcca  1800
tttactgcag atttcaccct tataagttta gaggtcatga aggttttaat gatcagtaaa  1860
gatttaaggg ttgagatttt taagaggcaa gagctgaaag cagaagacat gatcattagc  1920
cataagaaac tcaaaggagg aagacataat tagggaaaga agtctatttg atgaatatgt  1980
gtgtgtaagg tatgttctgc tttcttgatt caaaaatgaa gcaggcattg tctagctctt  2040
aggtgaaggg agtctctgct tttgaagaat ggcacaggta ggacagaagt atcatcccta  2100
ccccctaact aatctgttat taaagctaca aattcttcac acc                    2143
```

<210> 10
<211> 200
<212> PRT
<213> Homo sapiens

<400> 10

```
Met Gln Glu Cys Ile Asp Gln Lys Val Tyr Gln Ala Glu Val Asp Asn
1               5                  10                  15

Leu Pro Val Ala Phe Glu Asp Gly Ser Ile Asn Gly Gly Asp Arg Pro
            20                  25                  30

Gly Gly Ser Ser Leu Ser Ile Gln Thr Ala Asn Pro Gly Asn His Val
        35                  40                  45

Glu Ile Gln Ala Ala Tyr Ile Gly Thr Thr Ile Ile Ile Arg Gln Thr
    50                  55                  60

Ala Gly Gln Leu Ser Phe Ser Ile Lys Val Ala Glu Asp Val Ala Met
65                  70                  75                  80

Ala Phe Ser Ala Glu Gln Asp Leu Gln Leu Cys Val Gly Gly Cys Pro
                85                  90                  95

Pro Ser Gln Arg Leu Ser Arg Ser Glu Arg Asn Arg Arg Gly Ala Ile
            100                 105                 110
```

Thr Ile Asp Thr Ala Arg Arg Leu Cys Lys Glu Gly Leu Pro Val Glu
115 120 125

Asp Ala Tyr Phe His Ser Cys Val Phe Asp Val Leu Ile Ser Gly Asp
130 135 140

Pro Asn Phe Thr Val Ala Ala Gln Ala Ala Leu Glu Asp Ala Arg Ala
145 150 155 160

Phe Leu Pro Asp Leu Glu Lys Leu His Leu Phe Pro Ser Asp Ala Gly
165 170 175

Val Pro Leu Ser Ser Ala Thr Leu Leu Ala Pro Leu Leu Ser Gly Leu
180 185 190

Phe Val Leu Trp Leu Cys Ile Gln
195 200

<210> 11
<211> 313
<212> PRT
<213> Homo sapiens

<400> 11
Met Ile Gln His Asn Cys Ser Arg Gln Gly Pro Thr Ala Pro Pro Pro
1 5 10 15

Pro Arg Gly Pro Ala Leu Pro Gly Ala Gly Ser Gly Leu Pro Ala Pro
20 25 30

Asp Pro Cys Asp Tyr Glu Gly Arg Phe Ser Arg Leu His Gly Arg Pro
35 40 45

Pro Gly Phe Leu His Cys Ala Ser Phe Gly Asp Pro His Val Arg Ser
50 55 60

Phe His His His Phe His Thr Cys Arg Val Gln Gly Ala Trp Pro Leu
65 70 75 80

Leu Asp Asn Asp Phe Leu Phe Val Gln Ala Thr Ser Ser Pro Met Ala
85 90 95

Leu Gly Ala Asn Ala Thr Ala Thr Arg Lys Leu Thr Ile Ile Phe Lys
100 105 110

Asn Met Gln Glu Cys Ile Asp Gln Lys Val Tyr Gln Ala Glu Val Asp
115 120 125

Asn Leu Pro Val Ala Phe Glu Asp Gly Ser Ile Asn Gly Gly Asp Arg
130 135 140

Pro Gly Gly Ser Ser Leu Ser Ile Gln Thr Ala Asn Pro Gly Asn His
145 150 155 160

Val Glu Ile Gln Ala Ala Tyr Ile Gly Thr Thr Ile Ile Ile Arg Gln
165 170 175

Thr Ala Gly Gln Leu Ser Phe Ser Ile Lys Val Ala Glu Asp Val Ala
180 185 190

Met Ala Phe Ser Ala Glu Gln Asp Leu Gln Leu Cys Val Gly Gly Cys
195 200 205

Pro Pro Ser Gln Arg Leu Ser Arg Ser Glu Arg Asn Arg Arg Gly Ala
210 215 220

Ile Thr Ile Asp Thr Ala Arg Arg Leu Cys Lys Glu Gly Leu Pro Val
225 230 235 240

Glu Asp Ala Tyr Phe His Ser Cys Val Phe Asp Val Leu Ile Ser Gly
245 250 255

Asp Pro Asn Phe Thr Val Ala Ala Gln Ala Ala Leu Glu Asp Ala Arg
260 265 270

Ala Phe Leu Pro Asp Leu Glu Lys Leu His Leu Phe Pro Ser Asp Ala
275 280 285

Gly Val Pro Leu Ser Ser Ala Thr Leu Leu Ala Pro Leu Leu Ser Gly
290 295 300

Leu Phe Val Leu Trp Leu Cys Ile Gln
305 310

<210> 12
<211> 426
<212> PRT
<213> Homo sapiens

<400> 12
Met Gly Glu Pro Gly Gln Ser Pro Ser Pro Arg Ser Ser His Gly Ser
1 5 10 15

Pro Pro Thr Leu Ser Thr Leu Thr Leu Leu Leu Leu Leu Cys Gly His
20 25 30

Ala His Ser Gln Cys Lys Ile Leu Arg Cys Asn Ala Glu Tyr Val Ser
35 40 45

Ser Thr Leu Ser Leu Arg Gly Gly Gly Ser Ser Gly Ala Leu Arg Gly
50 55 60

Gly Gly Gly Gly Gly Arg Gly Gly Gly Val Gly Ser Gly Gly Leu Cys
65 70 75 80

Arg Ala Leu Arg Ser Tyr Ala Leu Cys Thr Arg Arg Thr Ala Arg Thr
85 90 95

Cys Arg Gly Asp Leu Ala Phe His Ser Ala Val His Gly Ile Glu Asp
100 105 110

Leu Met Ile Gln His Asn Cys Ser Arg Gln Gly Pro Thr Ala Pro Pro
115 120 125

Pro Pro Arg Gly Pro Ala Leu Pro Gly Ala Gly Ser Gly Leu Pro Ala
130 135 140

Pro Asp Pro Cys Asp Tyr Glu Gly Arg Phe Ser Arg Leu His Gly Arg
145 150 155 160

Pro Pro Gly Phe Leu His Cys Ala Ser Phe Gly Asp Pro His Val Arg
165 170 175

Ser Phe His His His Phe His Thr Cys Arg Val Gln Gly Ala Trp Pro
180 185 190

Leu Leu Asp Asn Asp Phe Leu Phe Val Gln Ala Thr Ser Ser Pro Met
195 200 205

Ala Leu Gly Ala Asn Ala Thr Ala Thr Arg Lys Leu Thr Ile Ile Phe
210 215 220

Lys Asn Met Gln Glu Cys Ile Asp Gln Lys Val Tyr Gln Ala Glu Val
225 230 235 240

Asp Asn Leu Pro Val Ala Phe Glu Asp Gly Ser Ile Asn Gly Gly Asp
245 250 255

Arg Pro Gly Gly Ser Ser Leu Ser Ile Gln Thr Ala Asn Pro Gly Asn
260 265 270

His Val Glu Ile Gln Ala Ala Tyr Ile Gly Thr Thr Ile Ile Ile Arg
275 280 285

Gln Thr Ala Gly Gln Leu Ser Phe Ser Ile Lys Val Ala Glu Asp Val
290 295 300

Ala Met Ala Phe Ser Ala Glu Gln Asp Leu Gln Leu Cys Val Gly Gly
305 310 315 320

Cys Pro Pro Ser Gln Arg Leu Ser Arg Ser Glu Arg Asn Arg Arg Gly
325 330 335

Ala Ile Thr Ile Asp Thr Ala Arg Arg Leu Cys Lys Glu Gly Leu Pro
340 345 350

Val Glu Asp Ala Tyr Phe His Ser Cys Val Phe Asp Val Leu Ile Ser
355 360 365

Gly Asp Pro Asn Phe Thr Val Ala Ala Gln Ala Ala Leu Glu Asp Ala
370 375 380

Arg Ala Phe Leu Pro Asp Leu Glu Lys Leu His Leu Phe Pro Ser Asp
385 390 395 400

Ala Gly Val Pro Leu Ser Ser Ala Thr Leu Leu Ala Pro Leu Leu Ser

405 410 415

Gly Leu Phe Val Leu Trp Leu Cys Ile Gln
420 425

<210> 13
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 13
gctgcctaca ttggcacaac t 21

<210> 14
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 14
gctgcctaca ctggcacaac t 21

<210> 15
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 15
tgtgttgggg ggtgccctcc a 21

<210> 16
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 16
tgtgttgggg tgtgccctcc a 21

<210> 17
<211> 21

<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 17
tacttccatt cctgtgtctt t 21

<210> 18
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 18
tacttccatt ctgtgtcttt 20

<210> 19
<211> 1919
<212> DNA
<213> Homo sapiens

<400> 19
tctatataga tattaataaa tctagagaga cagaaagcag actggtgatg gccagtctag 60
atggctagat agatagacat ggatatagat atagatctct atatagatag aggtagatac 120
agatatagat atatgcccta ttagttctgt tcctctagag aaccctaata cagtgaccgt 180
atttggaatc ggtccttctg ttaatttcac ttggcaagta ctaaaagatg atgatctcag 240
atatacctat ggctgcaaaa acatgacatg gctaaatccc ttggttgcag tatctctttt 300
ctttttaag gggggtgggg gggcgggtct cactgttgcc caggctggag tgcaatggcg 360
ttatcatagc tcactgcagc ctcaaactcc tgcgctcaag tgaccctcct gcctcagctc 420
ccaaagtgct gagattttgc aatatttatg gtcacaagat tatgttattc cataaaagta 480
tctttctgag gctaggcatg ttggttcaca cttgtaatcc cagcactctg agaggctgag 540
atggaaggat tcattgaggc aaggagttca agaccagcct ggtcaacata gtgagacctc 600
atctcggaag gaaggaagga aggagggagg gaggaaggga gggagtgaag gaaggaagga 660
aggaaggaag gaaggaagga aggaaggaag gaaggaagga aaagtatatt tttgaatctt 720
tttctatttc tccaactctt tctttagaag aattctattt ccattctttc ttcacctctt 780
tgcctttgtt agccttctct ccaagcaaat cgggagcctt tatttttgt gtattcatga 840
gggagaggaa gatgaattgc tgtacaaact aaagtaatga aaatggagta ggtaggagga 900
tagacagctg caaggatctg agctggatag actgaacaaa ccctcatcct aagcaactca 960
cagctcagat ttcttctctg gacagctggc ttttttcgtc cttctgaaat actctgcaaa 1020
gataggagag gggctatgaa ctacctctgc tatggatctt attcaaagtc agctacctcc 1080
tagatactat ctgtagaacc taaatgtaat attcagcata gcagggatga acatggtaaa 1140
tgaaaggtat ccaattgccc actgtaattt ttaaaggcca ggagctcaac attattgaaa 1200
atgctggagg gctgcctgga gtaggcagtg accacagagt cacacaagct ggaattggat 1260
atccaacttg tctgtcatat ttctctcctc cctccctgac ttggcactca atactccata 1320
ttctttctaa tcctctaacc ctccccactc ccccaactcc cacaccctac ccccaccaac 1380
gttcctggaa ttttggactt agctatttt aaaaccgtca actcagtagc cacctccctc 1440
cctgctcagc tgtccagtac tctggccagc catatactcc cccttccccc cataccaaac 1500
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 1560
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 1620
agcagagtaa tgtttgacct ctggaaacag taagtcaaaa tgaaattgca attcctttaa 1680

taagctttta tattgaagtt agacttttat aaaattacaa acacctactt ggatgtctct 1740
cgtccaaatg ctgggatctc tccctaccaa ggtgccccaa tctccatttc tctttctgtc 1800
ttatttcttt ctggcctctg gcctctagct ttttgaagtt taattctctg tctctcctct 1860
ggcagtctta gccctctctt taccttatta cctcaagact cctgatgaag ttttagaag 1919

<210> 20
<211> 1020
<212> DNA
<213> Mus musculus

<400> 20
tgtattgacg aggaggaggg attgttgcac acactagcgt aatggaaaag gtggagatag 60
aatagacagc tgcagagatc tgatccggac agacagaata aaccctcctc cgaaacaatt 120
ctgctctcgg gtttcttctc cagacagctg gcctttcggc ttctgaaata gttggcggag 180
atgggggagg gtctctgaac tacgcctgcc atccatcttc aaagccagct acctctacgt 240
accatgtgtg gaaactcagt ggcatcctca gtaaagagag gatgagaacg gtgagtgaca 300
ggcgtcacac aaatcaccac cagccgtctt acaggccggg agctcattac tgagaacgct 360
aaaggacctg agtggcaggt catacaagct gcagttggac atgggacttg gccatcgttc 420
tctctttagg cagtccctca cttggtaccc agcattccca tattccctct ttattttgct 480
catcattcct gctgccttag ctcccacacc ctactgccac caacgttcct ggaattttgg 540
acctagctat ttttaaaact gtcaactcag gaggcacctc cctcctcctc tcagctgtcc 600
agtgcttggg ccaaccatat actctccctg ccccctcccc ccacaccaaa gctcctctgg 660
ctctctgacc tcggtgagat tgcagccagt ccgggggatc ggggacagac atggagaagg 720
agatggagga ccccctggct ggagcagacc aacagaatag gcaactatgg ctggagaacc 780
gggtatcaga gtaatgcttg acctcgggaa acagtaagtc tagatgaaat ggcggttgct 840
ttgataagct tttgggtcga ggctagaatt tcataaagtt acagacatct gttctgaaaa 900
ctaagatctc tccttaccag ataccccaat cttcactttt ggaccgcctg ctcatacact 960
tattccaaag aagggttttg acaggagaaa gggagacaga cccctcccaa tatctgttcc 1020

<210> 21
<211> 1120
<212> DNA
<213> Rattus rattus

<400> 21
tctggcccca cttctctgtg gatcggtcat cttcaaaacc agttcagctt cccactgccc 60
ccaccacccc cgaaacccgg aagcttctgt tttttgtgtt tgtattgacg aggaggaggg 120
attgttgcac acactagcgt aatggaaaag gtggagatag aatagacagc tgcagagatc 180
tgatccggac agacagaata aaccctcctc cgaaacaatt ctgctctcgg gtttcttctc 240
cagacagctg gcctttcggc ttctgaaata gttggcggag atgggggagg gtctctgaac 300
tacgcctgcc atccatcttc aaagccagct acctctacgt accatgtgtg gaaactcagt 360
ggcatcctca gtaaagagag gatgagaacg gtgagtgaca ggcgtcacac aaatcaccac 420
cagccgtctt acaggccggg agctcattac tgagaacgct aaaggacctg agtggcaggt 480
catacaagct gcagttggac atgggacttg gccatcgttc tctctttagg cagtccctca 540
cttggtaccc agcattccca tattccctct ttattttgct catcattcct gctgccttag 600
ctcccacacc ctactgccac caacgttcct ggaattttgg acctagctat ttttaaaact 660
gtcaactcag gaggcacctc cctcctcctc tcagctgtcc agtgcttggg ccaaccatat 720
actctccctg ccccctcccc ccacaccaaa gctcctctgg ctctctgacc tcggtgagat 780
tgcagccagt ccgggggatc ggggacagac atggagaagg agatggagga ccccctggct 840
ggagcagacc aacagaatag gcaactatgg ctggagaacc gggtatcaga gtaatgcttg 900
acctcgggaa acagtaagtc tagatgaaat ggcggttgct ttgataagct tttgggtcga 960
ggctagaatt tcataaagtt acagacatct gttctgaaaa ctaagatctc tccttaccag 1020
ataccccaat cttcactttt ggaccgcctg ctcatacact tattccaaag aagggttttg 1080
acaggagaaa gggagacaga cccctcccaa tatctgttcc 1120

<210> 22
<211> 7265
<212> DNA
<213> Homo sapiens

<400> 22
tctatataga tattaataaa tctagagaga cagaaagcag actggtgatg gccagtctag 60
atggctagat agatagacat ggatatagat atagatctct atatagatag aggtagatac 120
agatatagat atatgcccta ttagttctgt tcctctagag aaccctaata cagtgaccgt 180
atttggaatc ggtccttctg ttaatttcac ttggcaagta ctaaaagatg atgatctcag 240
atatacctat ggctgcaaaa acatgacatg gctaaatccc ttggttgcag tatctctttt 300
ctttttaag gggggtgggg gggcgggtct cactgttgcc caggctggag tgcaatggcg 360
ttatcatagc tcactgcagc ctcaaactcc tgcgctcaag tgaccctcct gcctcagctc 420
ccaaagtgct gagattttgc aatatttatg gtcacaagat tatgttattc cataaaagta 480
tctttctgag gctaggcatg ttggttcaca cttgtaatcc cagcactctg agaggctgag 540
atggaaggat tcattgaggc aaggagttca agaccagcct ggtcaacata gtgagacctc 600
atctcggaag gaaggaagga aggagggagg gaggaaggga gggagtgaag gaaggaagga 660
aggaaggaag gaaggaagga aggaaggaag gaaggaagga aaagtatatt tttgaatctt 720
tttctatttc tccaactctt tctttagaag aattctattt ccattctttc ttcacctctt 780
tgcctttgtt agccttctct ccaagcaaat cgggagcctt tatttttgt gtattcatga 840
gggagaggaa gatgaattgc tgtacaaact aaagtaatga aaatggagta ggtaggagga 900
tagacagctg caaggatctg agctggatag actgaacaaa ccctcatcct aagcaactca 960
cagctcagat ttcttctctg gacagctggc ttttttcgtc cttctgaaat actctgcaaa 1020
gataggagag gggctatgaa ctacctctgc tatggatctt attcaaagtc agctacctcc 1080
tagatactat ctgtagaacc taaatgtaat attcagcata gcagggatga acatggtaaa 1140
tgaaaggtat ccaattgccc actgtaattt ttaaaggcca ggagctcaac attattgaaa 1200
atgctggagg gctgcctgga gtaggcagtg accacagagt cacacaagct ggaattggat 1260
atccaacttg tctgtcatat ttctctcctc cctccctgac ttggcactca atactccata 1320
ttctttctaa tcctctaacc ctccccactc ccccaactcc cacaccctac ccccaccaac 1380
gttcctggaa ttttggactt agctattttt aaaaccgtca actcagtagc cacctccctc 1440
cctgctcagc tgtccagtac tctggccagc catatactcc cccttccccc cataccaaac 1500
cttctctggt tccctgacct cagtgagaca gcagccggcc tggggacctg ggggagacac 1560
ggaggacccc ctggctggag ctgacccaca gagtagggaa tcatggctgg agaattggat 1620
agcagagtaa tgtttgacct ctggaaacag taagtcaaaa tgaaattgca attcctttaa 1680
taagctttta tattgaagtt agacttttat aaaattacaa acacctactt ggatgtctct 1740
cgtccaaatg ctgggatctc tccctaccaa ggtgccccaa tctccatttc tctttctgtc 1800
ttatttcttt ctggcctctg gcctctagct ttttgaagtt taattctctg tctctcctct 1860
ggcagtctta gccctctctt taccttatta cctcaagact cctgatgaag ttttagaagg 1920
agttccctac gtcctctatt ctgtagtttt cttaccaagg ccaaatatga cctcagatga 1980
tgagtcactg ataccctttct atcctgcccc cacttagcaa tgcccttcac attgagattc 2040
caagcatggg ggctgctccc tgtaaatgat ttctccccac aactctagtc cctccattct 2100
attctccctc ttgcaggact cttcccccaa tcatatcctt acccataaga taggggagtt 2160
aggcaggagg gatttagccc ctctccaact cctgtcatca taaaagactg agaacttcag 2220
aatttgaaaa gaagagatta atggaaggag tgatatttgg gaaaatacaa gaactgttga 2280
cttagaaaaa acaaatattg atttgcatgt ttggtttgca tcccattatt ccatgagaga 2340
gggagattaa aattgcagct ctctagagct gatgaaaaga gattggtttc cttttcattt 2400
gaatactgat attctagacg ggatgggtat gccaccctta atccttcttg tgttctgaca 2460
caaaggagga aaagaaatgt atgactccta gagggcatct cctcctaatg gagagggaca 2520
aataagaagt atgtttctga aatattttca ggtcctaatt ttactagggt acccactagg 2580
attactggta tctgatctag ccccatgatt cctccatctt tgacatacct gctgtttggt 2640
agctcagaat ggagcaatac agtggactct gccccccttga gttcactcaa ccttccctcc 2700
acccccacct aggggtattg cacaagggcc ctaaaagtgg ccacaggaac agggcaaaga 2760
ggcttaactg ccacacttat agtttgagga actccaatct ccccaaattc cagtctgttc 2820
atcctttttct tgatctcccc agattcactc cacattatcc ttaccaatct tcaattcttc 2880

tctctctcca tgtccagcca aatttctttt ttcagtcact tacagggctt ccggtcaaaa 2940
ttcactaggt aggagggtca tcagctggga agaaccggcg cctgggaaac ctggctggat 3000
aggtatgggg gagccaggcc agtcccctag tcccaggtcc tcccatggca gtcccccaac 3060
tctaagcact ctcactctcc tgctgctcct ctgtggacat ggtaaggaag ggccagggaa 3120
gggtttgggg aaatctagag ggtaggctgc tatgtagggg tgggcatgtg agcctgaatg 3180
agtgaggaga gataggcgct gagagtcccg atcactcgcc ctgctctcaa atactaatat 3240
tttatttccc gttcagtctg gggaaggcca ctggggaagc ccttggtcga caggcagaag 3300
agatgtggca ggcttacaca cttttagtaa gacagccgag agaactaggg actaggggt 3360
tgggggctgg ggaaggccct tagttaggtt ttaggaaggc tggaaacccc tgatgagatt 3420
tggaagagtt atgagcaaac tacactccga tagagcagag gtctgaggac cgtctcacaa 3480
tcctctccct tctgtcttta gctcattctc aatgcaagat cctccgctgc aatgctgagt 3540
acgtatcgtc cactctgagc cttagaggtg ggggttcatc aggagcactt cgaggaggag 3600
gaggaggagg ccggggtgga ggggtgggct ctggcggcct ctgtcgagcc ctccgctcct 3660
atgcgctctg cactcggcgc accgcccgca cctgccgcgg ggacctcgcc ttccattcgg 3720
cggtacatgg catcgaagac ctgatgatcc agcacaactg ctcccgccag ggccctacag 3780
ccccctcccc gccccggggc cccgcccttc caggcgcggg ctccggcctc cctgccccgg 3840
acccttgtga ctatgaaggc cggttttccc ggctgcatgg tcgtcccccg gggttcttgc 3900
attgcgcttc cttcggggac ccccatgtgc gcagcttcca ccatcacttt cacacatgcc 3960
gtgtccaagg agcttggcct ctactggata atgacttcct ctttgtccaa gccaccagct 4020
cccccatggc gttgggggcc aacgctaccg ccacccggaa ggtcaggcac tcaatcttcc 4080
ttccgatcca cctcatgaga ttcttccacg ggcaccattc ctccccatcc ccactattca 4140
acagcaatgc tccctaattc ccttttcttc ctcaacctct cccccatctc gaatcactcc 4200
cttctaccaa acacctggag ctgtaaatca cttccccttg atgggaattt gactcaaatg 4260
cagaaaacct tgaagagaca gtcggagagg gcggacctga ggagtttcag aagggaaact 4320
tttccctctc ctaggaagtt gccacgatta agtagagagg gggttaagta gggatgaggt 4380
aatactggaa cataaatagg agaagggatc aaggattgag ggccatagta gtcctgcatc 4440
tctacttgga tcagatctct aactatgtat gaggtctgat tgggggggaag atgcactgaa 4500
cccaaaatga actgttttcc ctcttgtcct cacagctcac catcatattt aagaacatgc 4560
aggaatgcat tgatcagaag gtgtatcagg ctgaggtgga taatcttcct gtagcctttg 4620
aagatggttc tatcaatgga ggtgaccgac ctgggggatc cagtttgtcg attcaaactg 4680
ctaaccctgg gaaccatgtg gagatccaag ctgcctacat tggcacaact ataatcattc 4740
ggcagacagc tgggcagctc tccttctcca tcaaggtagc agaggatgtg gccatggcct 4800
tctcagctga acaggacctg cagctctgtg ttgggggggtg ccctccaagt cagcgactct 4860
ctcgatcaga gcgcaatcgt cggggagcta taaccattga tactgccaga cggctgtgca 4920
aggaagggct tccagtggaa gatgcttact tccattcctg tgtctttgat gttttaattt 4980
ctggtgatcc caactttacc gtggcagctc aggcagcact ggaggatgcc cgagccttcc 5040
tgccagactt agagaagctg catctcttcc cctcagatgc tggggttcct ctttcctcag 5100
caaccctctt agctccactc ctttctgggc tctttgttct gtggctttgc attcagtaag 5160
gggaccatca gtcccattac tagtttggaa atgatttgga gatacagatt ggcatagaag 5220
aatgtaaaga atcattaaag gaagcagggc ctaggagaca cgtgaaacaa tgacattatc 5280
cagagtcaga tgaggctgca gtccagggtt gaaattatca cagaataagg attctgggca 5340
aggttactgc attccggatc tctgtggggc tcttcaccaa tttttccagc ctcatttata 5400
gtaaacaaat tgttctaatc catttactgc agatttcacc cttataagtt tagaggtcat 5460
gaaggtttta atgatcagta aagatttaag ggttgagatt tttaagaggc aagagctgaa 5520
agcagaagac atgatcatta gccataagaa actcaaagga ggaagacata attagggaaa 5580
gaagtctatt tgatgaatat gtgtgtgtaa ggtatgttct gctttcttga ttcaaaaatg 5640
aagcaggcat tgtctagctc ttaggtgaag ggagtctctg cttttgaaga atggcacagg 5700
taggacagaa gtatcatccc taccccctaa ctaatctgtt attaaagcta caaattcttc 5760
acaccatcct ctgttgccta tgttgaatct ctttacagat gcttgaaatg gagtaaatgc 5820
aatgtgttca ctccactgaa agagggctcg gaagtatcag atactgttgc tatctcaggg 5880
agtttacagg ctattggaga gacaaaacca attcacatga aagagtgatg agtgtgtaat 5940
tattcactaa atcctacagt atggtacatt cagatgggaa gatggtagat ttgaactaaa 6000
gtaataagaa taataaaagg taacagagaa gatgggattt gaagtgagct ttgaagactg 6060
ggtaagattc aaattgttaa cgatcttcca ggcaatgaaa accatctgga gttatgcatg 6120
gattcatgat tcagcaagga aatgagcaaa actcaaatgc agtagacaag gagtaatggg 6180
acagaaggtt agatgggcag aggccagatt atgaagcacc ttaaaaaggg ggtaaggggt 6240

ttaaatttga ttaatatcta acacttattg aaacttaaaa tctgccaggc aatgttttaa 6300
acacttttaa aacattgact taattctcat agctctctaa ggaaggtggt attcttatct 6360
ctatttttat ataaggaaac ttgcctccag tcacacagct aacaaattat ggaacttgcc 6420
tccagtcaca cagttaacaa atggcagagc cagaaactga acctatgccg tttggatccc 6480
gaaacttaat ttttaatcac tatactatat tgtcaaggaa gcagagagcc attaaagatt 6540
ctggttgtgg agctggtaaa gattctaaaa ggggagttgt ggtggtcaat gtcaccacaa 6600
aagctactct gaggctgggc gcggtggctg acacctgtaa tccagcactt tggtaggcca 6660
atgtgggtgg atcacttgag gccaggagtt cgagaccagc ctgggcaaca tggtaaaacc 6720
ccatctctac taaaaataca agaaatttgc caggcatgat agtccatgcc tgtaatcctg 6780
taatccaagc tactcaggag gcagaggcat gagaatcgag aattgcttga acccgggcca 6840
ggaggcagag gttgcagtga gctgagacca cgccactgca ctccagcctg ggcaacagag 6900
tgagactatc aaacaaaaaa caactactct cttctcatat tctcatataa agccaaaaag 6960
agagagttgg aaaaggaggg aaagcccaaa gttgaaggaa tctagtttgt agaagaaaga 7020
ctgagaagaa atgctgttct agatgagggt gctctaaagt aacaatgctg ctctgaacaa 7080
aattatgaag gaggtaactt ttacatttaa tatcttccct gtttctggtc tcatcctccc 7140
ctctcaggta ctccataacc gaggacctgt cctccctgcc ctaatcaagt actcaccatt 7200
atcttccacc tctcctctca gtccctgaca cccgacaata ctccccctgaa caaatattac 7260
agtag 7265

<210> 23
<211> 450
<212> PRT
<213> Homo sapiens

<400> 23

```
Met Gln Pro Pro Arg Glu Arg Leu Val Val Thr Gly Arg Ala Gly Trp
1               5                  10                  15

Met Gly Met Gly Arg Gly Ala Gly Arg Ser Ala Leu Gly Phe Trp Pro
            20                  25                  30

Thr Leu Ala Phe Leu Leu Cys Ser Phe Pro Ala Ala Thr Ser Pro Cys
        35                  40                  45

Lys Ile Leu Lys Cys Asn Ser Glu Phe Trp Ser Ala Thr Ser Gly Ser
    50                  55                  60

His Ala Pro Ala Ser Asp Asp Thr Pro Glu Phe Cys Ala Ala Leu Arg
65                  70                  75                  80

Ser Tyr Ala Leu Cys Thr Arg Arg Thr Ala Arg Thr Cys Arg Gly Asp
                85                  90                  95

Leu Ala Tyr His Ser Ala Val His Gly Ile Glu Asp Leu Met Ser Gln
            100                 105                 110

His Asn Cys Ser Lys Asp Gly Pro Thr Ser Gln Pro Arg Leu Arg Thr
        115                 120                 125

Leu Pro Pro Ala Gly Asp Ser Gln Glu Arg Ser Asp Ser Pro Glu Ile
    130                 135                 140

Cys His Tyr Glu Lys Ser Phe His Lys His Ser Ala Thr Pro Asn Tyr
145                 150                 155                 160
```

Thr His Cys Gly Leu Phe Gly Asp Pro His Leu Arg Thr Phe Thr Asp
165 170 175

Arg Phe Gln Thr Cys Lys Val Gln Gly Ala Trp Pro Leu Ile Asp Asn
180 185 190

Asn Tyr Leu Asn Val Gln Ala Thr Asn Thr Pro Val Leu Pro Gly Ser
195 200 205

Ala Ala Thr Ala Thr Ser Lys Leu Thr Ile Ile Phe Lys Asn Phe Gln
210 215 220

Glu Cys Val Asp Gln Lys Val Tyr Gln Ala Glu Met Asp Glu Leu Pro
225 230 235 240

Ala Ala Phe Val Asp Gly Ser Lys Asn Gly Gly Asp Lys His Gly Ala
245 250 255

Asn Ser Leu Lys Ile Thr Glu Lys Val Ser Gly Gln His Val Glu Ile
260 265 270

Gln Ala Lys Tyr Ile Gly Thr Thr Ile Val Val Arg Gln Val Gly Arg
275 280 285

Tyr Leu Thr Phe Ala Val Arg Met Pro Glu Glu Val Val Asn Ala Val
290 295 300

Glu Asp Trp Asp Ser Gln Gly Leu Tyr Leu Cys Leu Arg Gly Cys Pro
305 310 315 320

Leu Asn Gln Gln Ile Asp Phe Gln Ala Phe His Thr Asn Ala Glu Gly
325 330 335

Thr Gly Ala Arg Arg Leu Ala Ala Ala Ser Pro Ala Pro Thr Ala Pro
340 345 350

Glu Thr Phe Pro Tyr Glu Thr Ala Val Ala Lys Cys Lys Glu Lys Leu
355 360 365

Pro Val Glu Asp Leu Tyr Tyr Gln Ala Cys Val Phe Asp Leu Leu Thr
370 375 380

Thr Gly Asp Val Asn Phe Thr Leu Ala Ala Tyr Tyr Ala Leu Glu Asp
385 390 395 400

Val Lys Met Leu His Ser Asn Lys Asp Lys Leu His Leu Tyr Glu Arg
405 410 415

Thr Arg Asp Leu Pro Gly Arg Ala Ala Ala Gly Leu Pro Leu Ala Pro
420 425 430

Arg Pro Leu Leu Gly Ala Leu Val Pro Leu Leu Ala Leu Leu Pro Val
435 440 445

Phe Cys
450

<210> 24
<211> 478
<212> PRT
<213> Homo sapiens

<400> 24
Met Ile Arg Lys Lys Arg Lys Arg Ser Ala Pro Pro Gly Pro Cys Arg
1 5 10 15

Ser His Gly Pro Arg Pro Ala Thr Ala Pro Ala Pro Pro Pro Ser Pro
20 25 30

Glu Pro Thr Arg Pro Ala Trp Thr Gly Met Gly Leu Arg Ala Ala Pro
35 40 45

Ser Ser Ala Ala Ala Ala Ala Ala Glu Val Glu Gln Arg Arg Ser Pro
50 55 60

Gly Leu Cys Pro Pro Pro Leu Glu Leu Leu Leu Leu Leu Leu Phe Ser
65 70 75 80

Leu Gly Leu Leu His Ala Gly Asp Cys Gln Gln Pro Ala Gln Cys Arg
85 90 95

Ile Gln Lys Cys Thr Thr Asp Phe Val Ser Leu Thr Ser His Leu Asn
100 105 110

Ser Ala Val Asp Gly Phe Asp Ser Glu Phe Cys Lys Ala Leu Arg Ala
115 120 125

Tyr Ala Gly Cys Thr Gln Arg Thr Ser Lys Ala Cys Arg Gly Asn Leu
130 135 140

Val Tyr His Ser Ala Val Leu Gly Ile Ser Asp Leu Met Ser Gln Arg
145 150 155 160

Asn Cys Ser Lys Asp Gly Pro Thr Ser Ser Thr Asn Pro Glu Val Thr
165 170 175

His Asp Pro Cys Asn Tyr His Ser His Ala Gly Ala Arg Glu His Arg
180 185 190

Arg Gly Asp Gln Asn Pro Pro Ser Tyr Leu Phe Cys Gly Leu Phe Gly
195 200 205

Asp Pro His Leu Arg Thr Phe Lys Asp Asn Phe Gln Thr Cys Lys Val
210 215 220

Glu Gly Ala Trp Pro Leu Ile Asp Asn Asn Tyr Leu Ser Val Gln Val
225 230 235 240

Thr Asn Val Pro Val Val Pro Gly Ser Ser Ala Thr Ala Thr Asn Lys
245 250 255

Ile Thr Ile Ile Phe Lys Ala His His Glu Cys Thr Asp Gln Lys Val

260 265 270

Tyr Gln Ala Val Thr Asp Asp Leu Pro Ala Ala Phe Val Asp Gly Thr
275 280 285

Thr Ser Gly Gly Asp Ser Asp Ala Lys Ser Leu Arg Ile Val Glu Arg
290 295 300

Glu Ser Gly His Tyr Val Glu Met His Ala Arg Tyr Ile Gly Thr Thr
305 310 315 320

Val Phe Val Arg Gln Val Gly Arg Tyr Leu Thr Leu Ala Ile Arg Met
325 330 335

Pro Glu Asp Leu Ala Met Ser Tyr Glu Glu Ser Gln Asp Leu Gln Leu
340 345 350

Cys Val Asn Gly Cys Pro Leu Ser Glu Arg Ile Asp Asp Gly Gln Gly
355 360 365

Gln Val Ser Ala Ile Leu Gly His Ser Leu Pro Arg Thr Ser Leu Val
370 375 380

Gln Ala Trp Pro Gly Tyr Thr Leu Glu Thr Ala Asn Thr Gln Cys His
385 390 395 400

Glu Lys Met Pro Val Lys Asp Ile Tyr Phe Gln Ser Cys Val Phe Asp
405 410 415

Leu Leu Thr Thr Gly Asp Ala Asn Phe Thr Ala Ala Ala His Ser Ala
420 425 430

Leu Glu Asp Val Glu Ala Leu His Pro Arg Lys Glu Arg Trp His Ile
435 440 445

Phe Pro Ser Ser Gly Asn Gly Thr Pro Arg Gly Gly Ser Asp Leu Ser
450 455 460

Val Ser Leu Gly Leu Thr Cys Leu Ile Leu Ile Val Phe Leu
465 470 475

<210> 25
<211> 420
<212> PRT
<213> Mus musculus

<400> 25

Met Gly Gln Ser Pro Ser Pro Arg Ser Pro His Gly Ser Pro Pro Thr
1 5 10 15

Leu Ser Thr Leu Thr Leu Leu Leu Leu Leu Cys Gly Gln Ala His Ser
20 25 30

Gln Cys Lys Ile Leu Arg Cys Asn Ala Glu Tyr Val Ser Ser Thr Leu

```
                35                  40                  45

Ser Leu Arg Gly Gly Gly Ser Pro Asp Thr Pro Arg Gly Gly Gly Arg
    50                  55                  60

Gly Gly Leu Ala Ser Gly Gly Leu Cys Arg Ala Leu Arg Ser Tyr Ala
65                  70                  75                  80

Leu Cys Thr Arg Arg Thr Ala Arg Thr Cys Arg Gly Asp Leu Ala Phe
                85                  90                  95

His Ser Ala Val His Gly Ile Glu Asp Leu Met Ile Gln His Asn Cys
            100                 105                 110

Ser Arg Gln Gly Pro Thr Ala Pro Pro Pro Ala Arg Gly Pro Ala Leu
        115                 120                 125

Pro Gly Ala Gly Pro Ala Pro Leu Thr Pro Asp Pro Cys Asp Tyr Glu
    130                 135                 140

Ala Arg Phe Ser Arg Leu His Gly Arg Ala Pro Gly Phe Leu His Cys
145                 150                 155                 160

Ala Ser Phe Gly Asp Pro His Val Arg Ser Phe His Asn Gln Phe His
                165                 170                 175

Thr Cys Arg Val Gln Gly Ala Trp Pro Leu Leu Asp Asn Asp Phe Leu
            180                 185                 190

Phe Val Gln Ala Thr Ser Ser Pro Val Ser Ser Gly Ala Asn Ala Thr
        195                 200                 205

Thr Ile Arg Lys Ile Thr Ile Ile Phe Lys Asn Met Gln Glu Cys Ile
    210                 215                 220

Asp Gln Lys Val Tyr Gln Ala Glu Val Asp Asn Leu Pro Ala Ala Phe
225                 230                 235                 240

Glu Asp Gly Ser Ile Asn Gly Gly Asp Arg Pro Gly Gly Ser Ser Leu
                245                 250                 255

Ser Ile Gln Thr Ala Asn Leu Gly Ser His Val Glu Ile Arg Ala Ala
            260                 265                 270

Tyr Ile Gly Thr Thr Ile Ile Ile Arg Gln Thr Ala Gly Gln Leu Ser
        275                 280                 285

Phe Ser Ile Arg Val Ala Glu Asp Val Ala Arg Ala Phe Ser Ala Glu
    290                 295                 300

Gln Asp Leu Gln Leu Cys Val Gly Gly Cys Pro Pro Ser Gln Arg Leu
305                 310                 315                 320

Ser Arg Ser Glu Arg Asn Arg Arg Gly Ala Ile Ala Ile Asp Thr Ala
                325                 330                 335
```

```
Arg Arg Leu Cys Lys Glu Gly Leu Pro Val Glu Asp Ala Tyr Phe Gln
            340                 345                 350

Ser Cys Val Phe Asp Val Ser Val Ser Gly Asp Pro Asn Phe Thr Val
        355                 360                 365

Ala Ala Gln Thr Ala Leu Asp Asp Ala Arg Ile Phe Leu Thr Asp Leu
    370                 375                 380

Glu Asn Leu His Leu Phe Pro Ser Asp Ala Gly Pro Pro Leu Ser Pro
385                 390                 395                 400

Ala Ile Cys Leu Val Pro Leu Leu Ser Ala Leu Phe Val Leu Trp Leu
                405                 410                 415

Cys Phe Ser Lys
            420
```

<210> 26
<211> 422
<212> PRT
<213> Rattus rattus

<400> 26

```
Met Gly Asp Arg Gly Arg Ser Pro Ser Leu Arg Ser Pro His Gly Ser
1               5                   10                  15

Pro Pro Thr Leu Ser Thr Leu Thr Leu Leu Leu Leu Leu Cys Gly Gln
            20                  25                  30

Ala His Ser Gln Cys Lys Ile Leu Arg Cys Asn Ala Glu Tyr Val Ser
        35                  40                  45

Phe Thr Leu Ser Leu Arg Gly Gly Gly Ser Pro Asp Thr Pro Arg Gly
    50                  55                  60

Gly Gly Arg Gly Gly Pro Ala Ser Gly Gly Leu Cys Arg Ala Leu Arg
65                  70                  75                  80

Ser Tyr Ala Leu Cys Thr Arg Arg Thr Ala Arg Thr Cys Arg Gly Asp
                85                  90                  95

Leu Ala Phe His Ser Ala Val His Gly Ile Glu Asp Leu Met Ile Gln
            100                 105                 110

His Asn Cys Ser Arg Gln Gly Pro Thr Ala Ser Pro Pro Ala Arg Gly
        115                 120                 125

Pro Ala Leu Pro Gly Ala Gly Pro Ala Pro Leu Thr Pro Asp Pro Cys
    130                 135                 140

Asp Tyr Glu Ala Arg Phe Ser Arg Leu His Gly Arg Thr Pro Gly Phe
145                 150                 155                 160

Leu His Cys Ala Ser Phe Gly Asp Pro His Val Arg Ser Phe His Asn
```

165 170 175

His Phe His Thr Cys Arg Val Gln Gly Ala Trp Pro Leu Leu Asp Asn
180 185 190

Asp Phe Leu Phe Val Gln Ala Thr Ser Ser Pro Val Ala Ser Gly Ala
195 200 205

Asn Ala Thr Thr Ile Arg Lys Ile Thr Ile Ile Phe Lys Asn Met Gln
210 215 220

Glu Cys Ile Asp Gln Lys Val Tyr Gln Ala Glu Val Asp Asn Leu Pro
225 230 235 240

Ala Ala Phe Glu Asp Gly Ser Val Asn Gly Gly Asp Arg Pro Gly Gly
245 250 255

Ser Ser Leu Ser Ile Gln Thr Ala Asn Leu Gly Ser His Val Glu Ile
260 265 270

Arg Ala Ala Tyr Ile Gly Thr Thr Ile Ile Val Arg Gln Thr Ala Gly
275 280 285

Gln Leu Ser Phe Ser Ile Arg Val Ala Glu Asp Val Ala Arg Ala Phe
290 295 300

Ser Ala Glu Gln Asp Leu Gln Leu Cys Val Gly Gly Cys Pro Pro Ser
305 310 315 320

Gln Arg Leu Ser Arg Ser Glu Arg Asn Arg Arg Gly Ala Ile Ala Ile
325 330 335

Asp Thr Ala Arg Arg Leu Cys Lys Glu Gly Leu Pro Val Glu Asp Ala
340 345 350

Tyr Phe Gln Ser Cys Val Phe Asp Val Ser Val Ser Gly Asp Pro Asn
355 360 365

Phe Thr Val Ala Ala Gln Ser Ala Leu Asp Asp Ala Arg Val Phe Leu
370 375 380

Thr Asp Leu Glu Asn Leu His Leu Phe Pro Val Asp Ala Gly Pro Pro
385 390 395 400

Leu Ser Pro Ala Thr Cys Leu Val Arg Leu Leu Ser Val Leu Phe Val
405 410 415

Leu Trp Phe Cys Ile Gln
420

<210> 27
<211> 366
<212> PRT
<213> Fugu

<400> 27

Ala Ser Cys Arg Ile Leu Arg Cys Asn Ser Asp Phe Val Ala Ala Thr
1 5 10 15

Leu Asp Leu Gly Ser Ser Ala Gly Ala Gly Gly Gly Ala Pro Leu Ser
20 25 30

Arg Glu Ala Ala Asn Ala Glu Tyr Cys Arg Ala Leu His Ser Tyr Ser
35 40 45

Thr Cys Thr Lys Arg Met Ala Arg Pro Cys Arg Gly Asp Leu Ala Tyr
50 55 60

His Ser Ala Val Gln Gly Ile Glu Asp Leu Leu Ile Gln Tyr Arg Cys
65 70 75 80

Pro Leu Ala Gly Pro Thr Ala Gln Pro Arg Pro Leu Pro Pro Leu Leu
85 90 95

Ser Gly Asp Val Cys Leu Tyr Asp Arg Arg Leu Ala Ala Ala Glu Ala
100 105 110

Pro Gln Pro Asp Tyr Leu His Cys Gly Val Phe Gly Asp Pro His Ile
115 120 125

Arg Thr Phe Asn Asn Asp Phe His Thr Cys Ala Val Gln Gly Ala Trp
130 135 140

Pro Leu Ile Asp Asn Asp Phe Leu Tyr Val Gln Ala Thr Ser Ser Pro
145 150 155 160

Thr Arg Arg Gly Thr Gln Ala Thr Met Leu Thr Lys Ile Thr Val Ile
165 170 175

Val Lys Ser Trp Arg His Cys Val Asp Gln Gln Leu Tyr Gln Ala Glu
180 185 190

Leu Asp Asp Val Pro Met Ala Phe Ala Asp Gly Ser Val Val Ser Gly
195 200 205

Glu Arg Arg Gly Gln His Thr Leu Ala Ile Thr Gln Ser Pro Gly Arg
210 215 220

His Ala Glu Ile Arg Ala Ala His Ile Ala Thr Val Ala Ser Gly Gln
225 230 235 240

Ser Gly Arg Ser Leu Ser Leu Ser Val Tyr Ser Pro Arg Ser Val Val
245 250 255

Glu Ala Phe Gly Pro Glu Gln Asp Leu Gln Leu Cys Met Trp Gly Cys
260 265 270

Pro Ala Ser Gln Lys Leu Ser Thr Pro Pro Pro Thr Ser Ser Thr Phe
275 280 285

Ser Ala Ala Val Leu Ala His Cys Asp Ala Leu Leu Pro Val Arg Asp

290 295 300

Val Tyr His Gln Ala Cys Ile Phe Asp Leu Ile Thr Ser Gly Asp Leu
305 310 315 320

Asn Ser Ser Gly Ala Ala Ile Ser Ala Leu Gln Asp Ala Gln Lys Leu
325 330 335

Ile Ser Asp Pro Lys Arg Val His Leu Leu Ser Pro Thr Ser Ala Ala
340 345 350

Gln Arg Glu Asp His Leu Cys Leu Leu Leu Leu Leu Leu Ser
355 360 365

<210> 28
<211> 432
<212> PRT
<213> Chicken

<400> 28
Met Gly Arg Gly Ala Gly Ser Thr Ala Leu Gly Leu Phe Gln Ile Leu
1 5 10 15

Pro Val Phe Leu Cys Ile Phe Pro Pro Val Thr Ser Pro Cys Lys Ile
20 25 30

Leu Lys Cys Asn Ser Glu Phe Trp Ala Ala Thr Ser Gly Ser His His
35 40 45

Leu Gly Ala Glu Glu Thr Pro Glu Phe Cys Thr Ala Leu Arg Ala Tyr
50 55 60

Ala His Cys Thr Arg Arg Thr Ala Arg Thr Cys Arg Gly Asp Leu Ala
65 70 75 80

Tyr His Ser Ala Val His Gly Ile Asp Asp Leu Met Val Gln His Asn
85 90 95

Cys Ser Lys Asp Gly Pro Thr Ser Gln Pro Arg Leu Arg Thr Leu Pro
100 105 110

Pro Gly Asp Ser Gln Glu Arg Ser Asp Ser Pro Glu Ile Cys His Tyr
115 120 125

Glu Lys Ser Phe His Lys His Ser Ala Ala Pro Asn Tyr Thr His Cys
130 135 140

Gly Leu Phe Gly Asp Pro His Leu Arg Thr Phe Thr Asp Thr Phe Gln
145 150 155 160

Thr Cys Lys Val Gln Gly Ala Trp Pro Leu Ile Asp Asn Asn Tyr Leu
165 170 175

Asn Val Gln Val Thr Asn Thr Pro Val Leu Pro Gly Ser Ser Ala Thr

180 185 190

Ala Thr Ser Lys Leu Thr Ile Ile Phe Lys Ser Phe Gln Glu Cys Val
195 200 205

Glu Gln Lys Val Tyr Gln Ala Glu Met Asp Glu Leu Pro Ala Ala Phe
210 215 220

Ala Asp Gly Ser Lys Asn Gly Gly Asp Lys His Gly Ala Asn Ser Leu
225 230 235 240

Lys Ile Thr Glu Lys Val Ser Gly Gln His Ile Glu Ile Gln Ala Lys
245 250 255

Tyr Ile Gly Thr Thr Ile Val Val Arg Gln Val Gly Arg Tyr Leu Thr
260 265 270

Phe Ala Val Arg Met Pro Glu Glu Val Val Asn Ala Val Glu Asp Arg
275 280 285

Asp Ser Gln Gly Leu Tyr Leu Cys Leu Arg Gly Cys Pro Leu Asn Gln
290 295 300

Gln Ile Asp Phe Gln Thr Phe Arg Leu Ala Gln Ala Ala Glu Gly Arg
305 310 315 320

Ala Arg Arg Lys Gly Pro Ser Leu Pro Ala Pro Pro Glu Ala Phe Thr
325 330 335

Tyr Glu Ser Ala Thr Ala Lys Cys Arg Glu Lys Leu Pro Val Glu Asp
340 345 350

Leu Tyr Phe Gln Ser Cys Val Phe Asp Leu Leu Thr Thr Gly Asp Val
355 360 365

Asn Phe Met Leu Ala Ala Tyr Tyr Ala Phe Glu Asp Val Lys Met Leu
370 375 380

His Ser Asn Lys Asp Lys Leu His Leu Tyr Glu Arg Thr Arg Ala Leu
385 390 395 400

Ala Pro Gly Asn Ala Ala Pro Ser Glu His Pro Trp Ala Leu Pro Ala
405 410 415

Leu Trp Val Ala Leu Leu Ser Leu Ser Gln Cys Trp Leu Gly Leu Leu
420 425 430

<210> 29
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 29
tccaagtcag cgactctctc g 21

<210> 30
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Polynucleotide replication primer

<400> 30
tccaagtcag tgactctctc g 21

<210> 31
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 31
acctgccgcg gggacctcgc c 21

<210> 32
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 32
acctgccgcg tggacctcgc c 21

<210> 33
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 33
gcctgggaaa cctggctgga t 21

<210> 34
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 34
gcctgggaaa gctggctgga t 21

<210> 35
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 35
tcccttctgt ctttagctca t 21

<210> 36
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 36
tcccttctgt gtttagctca t 21

<210> 37
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 37
gaggaggagg ccggggtgga 20

<210> 38
<211> 23
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 38
gaggaggagg aggccggggt gga 23

<210> 39
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 39
gcctccctgc cccggaccct t 21

<210> 40
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 40
gcctccctgc gccggaccct t 21

<210> 41
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 41
atggtcgtcc cccggggttc t 21

<210> 42
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 42
atggtcgtcc accggggttc t 21

<210> 43
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 43
cgtcccccgg ggttcttgca t 21

<210> 44
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 44
cgtcccccgg cgttcttgca t 21

<210> 45
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 45
gtccaaggag cttggcctct a 21

<210> 46
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 46
gtccaaggag attggcctct a 21

<210> 47
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 47
cccccatggc gttgggggcc a 21

<210> 48
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 48
cccccatggc tttgggggcc a 21

<210> 49
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 49
taagaacatg caggaatgca t 21

<210> 50
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 50
taagaacatg aaggaatgca t 21

<210> 51
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 51
gccttctcag ctgaacagga c 21

<210> 52
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 52
gccttctcag gtgaacagga c 21

<210> 53
<211> 21

<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 53
agatgctggg gttcctcttt c 21

<210> 54
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Fragment containing polymorphism

<400> 54
agatgctggg attcctcttt c 21

<210> 55
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Forward replication primer

<400> 55
cacttgagcc caggaatttg 20

<210> 56
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Reverse replication primer

<400> 56
gactcactgc agccttgacc 20

<210> 57
<211> 22
<212> DNA
<213> Artificial

<220>
<223> Forward replication primer

<400> 57
gtgtgctaca agtttgccga at 22

<210> 58
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Reverse replication primer

<400> 58
gcttgaaact gggagttgga 20

<210> 59
<211> 22
<212> DNA
<213> Artificial

<220>
<223> Forward replication primer

<400> 59
gggaaatggt cccataattc ct 22

<210> 60
<211> 19
<212> DNA
<213> Artificial

<220>
<223> Reverse replication primer

<400> 60
cgccctgcca atatgttct 19

<210> 61
<211> 22
<212> DNA
<213> Artificial

<220>
<223> Forward replication primer

<400> 61
ggtacttagc ctcgaaatga ga 22

<210> 62
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Reverse replication primer

<400> 62
gtgtcacaca actggttggt 20